Maryland Historical Trust

Maryland Inventory of Historic Properties number: HA-1971

Name: 12001/ US 1 over Susquehanna River (Conowingo Dam)

The bridge referenced herein was inventoried by the Maryland State Highway Administration as part of the Historic Bridge Inventory, and SHA provided the Trust with eligibility determinations in February 2001. The Trust accepted the Historic Bridge Inventory on April 3, 2001. The bridge received the following determination of eligibility.

MARYLAND HISTORICAL TRUST

Eligibility Recommended ___X____ Eligibility Not Recommended _____

Criteria: ____A ____B ____C ____D Considerations: ___A ___B ___C ___D ___E ___F ___G __None

Comments: _____

_____

_____

Reviewer, OPS: _Anne E. Bruder_____ Date: __3 April 2001____

Reviewer, NR Program: __Peter E. Kurtze_____ Date: __3 April 2001____

MARYLAND INVENTORY OF HISTORIC BRIDGES **MHT No.** HA-1971
HISTORIC BRIDGE INVENTORY
MARYLAND STATE HIGHWAY ADMINISTRATION/
MARYLAND HISTORICAL TRUST

SHA Bridge No. 12001 **Bridge name** U.S. 1 over Susquehanna River (Conowingo Dam)

LOCATION:
Street/Road name and number [facility carried] U.S. 1 (Conowingo Road)

City/town Conowingo **Vicinity** X

County Harford

This bridge projects over: Road____ **Railway**_____ **Water** X **Land** ____

Ownership: State X **County** _____ **Municipal** _____ **Other** _____

HISTORIC STATUS:
Is the bridge located within a designated historic district? Yes _____ **No** X
National Register-listed district ____ **National Register-determined-eligible district** __
Locally-designated district _____ **Other** _____

Name of district _____

BRIDGE TYPE:
Timber Bridge _____:
Beam Bridge _____ **Truss -Covered** ___ **Trestle** ____ **Timber-And-Concrete** ___

Stone Arch Bridge _____

Metal Truss Bridge _____

Movable Bridge ____:
Swing _____ **Bascule Single Leaf** __ **Bascule Multiple Leaf** _____
Vertical Lift _____ **Retractile**_____ **Pontoon** _____

Metal Girder_____:
Rolled Girder _____ **Rolled Girder Concrete Encased** _____
Plate Girder _____ **Plate Girder Concrete Encased** _____

Metal Suspension _____

Metal Arch _____

Metal Cantilever _____

Concrete X:
Concrete Arch_____ **Concrete Slab** ____ **Concrete Beam** X **Rigid Frame** _____
Other _____ **Type Name** _____

DESCRIPTION:
Setting: Urban _____ **Small town** _____ **Rural** X

Describe Setting:

Bridge No. 12001 is a component of the Conowingo Dam and carries U.S. 1 (Conowingo Road) over the Susquehanna River in Harford County. U.S. 1 runs east-west and the Susquehanna River flows north-south. The bridge is located in the vicinity of Conowingo and is surrounded by wooded areas and a public recreation area on the west side of the river.

Describe Superstructure and Substructure:

Bridge No. 12001 is a component of the Conowingo Dam, a straight-crested, concrete gravity structure, constructed in 1927. The bridge consists of fifty-three (53) concrete beam spans, which are supported by fifty-two (52) piers constructed as integral parts of the dam. The dam rises from the river bed at elevations of 10 feet to 86 feet at the spillway and 114 feet at the east abutment.

From west to east, the structure consists of the following sections: a 950 foot, 6 inch-long abutment section, the 176 foot-long power station, three (3) regulating gates which are 135 feet long, the main spillway, which is 2250 feet long, and the 1200 foot-long east abutment. The crest of the dam has fifty (50) crest gates, supported by concrete piers which rise from the dam on 45 foot centers. The piers carry the highway bridge (#12001) and the gate-crane bridge. The total length of the dam and power station is approximately 4700 feet, reportedly the longest concrete slab dam in the United States (Famighetti 1995: 704).

The power house is located at the western end of the dam on the downstream side and is an integral component of the dam. The width of the building is 176 feet, including the dam structure. The height of the turbine hall roof is 102 feet above normal tail-water with the superstructure forming the high-tension sub-station. The sub-station rises approximately 90 feet above the turbine hall. A machine shop and offices are located at the western end of the building, adjacent to the shoreline.

The bridge component of the dam is a 53-span, 2-lane, concrete beam bridge. The bridge was originally built in 1927, along with the dam, and in 1982, the deck and parapets were replaced and the piers were repaired. The structure has a clear roadway width of 20 feet. The out-to-out width is 24 feet, 5 inches. The superstructure consists of concrete beams which support a concrete deck and concrete, jersey-barrier parapets. The concrete deck is approximately 15 inches thick and it has no bituminous wearing surface. The structure has concrete, jersey-barrier parapets, which replaced the original concrete parapets circa 1980. The substructure consists of two (2) concrete abutments and it has solid shaft, concrete piers. The most recent sufficiency rating available for the bridge is 23.92 in 1979, however replacement of the deck and parapets and repair of the piers have occurred since that time.

The inspection report for this structure from 1997 indicates that the bridge is in good condition, though minorly affected by light spalling and efflorescence.

Discuss Major Alterations:

The original concrete deck and integral concrete parapets were removed during the 1982 superstructure rehabilitation and replaced with a new concrete deck and concrete, jersey-barrier parapets. In addition, repairs were made to the piers consisting of the removal and recasting of the top portions of the piers in the section of the floodgate and north of the floodgates.

HISTORY:

WHEN was the bridge built: 1927
This date is: Actual X **Estimated** _____
Source of date: Plaque _____ **Design plans** X **County bridge files/inspection form** ___
Other (specify): State Highway Administration bridge files

WHY was the bridge built?

U.S. 1 is the oldest U.S. route in Maryland and formerly crossed the Susquehanna River on an iron truss bridge with stone piers, two (2) miles upstream at the village of Conowingo. Because the bridge and a part of the main highway were below the level of the reservoir created by construction of the Conowingo Dam, replacement of the highway and bridge was included in the construction cost of the dam.

WHO was the designer?

Stone and Webster

WHO was the builder?

The Susquehanna Power Company and the Philadelphia Electric Power Company

WHY was the bridge altered?

The bridge was altered to correct functional or structural deficiencies.

Was this bridge built as part of an organized bridge-building campaign?

There is no evidence that the bridge was built as part of an organized bridge building campaign.

SURVEYOR/HISTORIAN ANALYSIS:

This bridge may have National Register significance for its association with:
A - Events _____ **B- Person** _____
C- Engineering/architectural character X

The Conowingo Dam is eligible for the National Register of Historic Places under Criterion C, as a significant example of twentieth century dam construction with a high degree of integrity. Bridge 12001 is an integral component of the Conowingo Dam. With the exception of the bridge deck and parapets, the substructure and superstructure of the bridge are intact. In addition, the dam's architectural components, power house and substation are intact. Finally, the structure is reportedly the longest concrete slab dam in the United States.

Was the bridge constructed in response to significant events in Maryland or local history?

The Conowingo Dam was constructed as a commercial enterprise to provide hydro-electric power. As a component of the dam, a concrete beam bridge was constructed to carry U.S. 1 over the Susquehanna River. The bridge was opened to the public on November 15, 1927 and the first power for commercial operations was transmitted to Philadelphia on March 1, 1928.

The earliest concrete beam bridges in the nation were deck girder spans that featured concrete slabs supported by a series of longitudinal concrete beams. This method of construction was conceptually quite similar to the traditional timber beam bridge which had found such widespread use both in Europe and in America. Developed early in the twentieth century, deck girder spans continued to be widely used in 1920 when noted bridge engineer Milo Ketchum wrote *The Design of Highway Bridges of Steel, Timber and Concrete* (Ketchum 1920).

Although visually similar to deck girder bridges, the T-beam span features a series of reinforced concrete beams that are integrated into the concrete slab, forming a monolithic mass appearing in cross section like a series of upper-case "T"s connected at the top. Thaddeus Hyatt is believed to have been the first to come upon the idea of the T-beam when he was studying reinforced concrete in the 1850s, but the first useful T-beam was developed by the Belgian Francois Hennebique at the turn of the present century (Lay 1992:293). The earliest references to T-beam bridges refer to the type as concrete slab and beam construction, a description that does not distinguish the T-beam design from the concrete deck girder. Henry G. Tyrrell was perhaps the first American bridge engineer to use the now standard term "T-beam" in his treatise *Concrete Bridges and Culverts*, published in 1909. Tyrrell commented that "it is permissible and good practice in designing small concrete beams which are united by slabs, to consider the effect of a portion of the floor slab and to proportion the beams as T-beams" (Tyrrell 1909:186).

By 1920, reinforced concrete, T-beam construction had found broad application in standardized bridge design across the United States. In his text, *The Design of Highway Bridges of Steel, Timber and Concrete*, Milo S. Ketchum included drawings of standard T-beam spans recommended by the U.S. Bureau of Public Roads as well as drawings of T-beam bridges built by state highway departments in Ohio, Michigan, Illinois, and Massachusetts (Ketchum 1920). By the 1930s the T-beam bridge was widely built in Maryland and Virginia.

Maryland's roads and bridge improvement programs mirrored economic cycles. The first road improvement of the State Roads Commission was a 7 year program, starting with the Commission's establishment in 1908 and ending in 1915. Due to World War I, the period from 1916-1920 was one of relative inactivity; only roads of first priority were built. Truck traffic resulting from war related factories and military installations generated new, heavy traffic unanticipated by the builders of the early road system. From 1920-1929, numerous highway improvements occurred in response to the increase in Maryland motor vehicles from 103,000 in 1920 to 320,000 in 1929, with emphasis on the secondary system of feeder roads which moved traffic from the primary roads built before World War I. After World War I, Maryland's bridge system also was appraised as too narrow and structurally inadequate for the increasing traffic , with plans for an expanded bridge program to be handled by the Bridge Division, set up in 1920. In 1920 under Chapter 508 of the Acts of 1920 the State issued a bond of $3,000,000.00 for road construction; the primary purpose of these monies was to meet the state obligations involving the construction of rural post roads. The secondary purpose of these monies was to fund (with an equal sum from the counties) the building of lateral roads. The number of hard surfaced roads on the state system grew from 2000 in 1920 to 3200 in 1930. By 1930, Maryland's primary system had been inadequate to the huge freight trucks and volume of passenger cars in use, with major improvements occurring in the late 1930's. Most improvements to local roads waited until the years after World War I.

In the early years, there was a need to replace the numerous single lane timber bridges. Walter Wilson Crosby, Chief Engineer, stated in 1906, "the general plan has been to replace these [wood bridges] with pipe culverts or concrete bridges and thus forever do away with the further expense of the maintenance of expensive and dangerous wooden structures." Within a few years, readily constructed standardized bridges of concrete were being built throughout the state.

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In 1930, the roadway width for all standard plan bridges was increased to 27 feet in order to accommodate the increasing demands of automobile and truck traffic (State Roads Commission 1930). The range of span lengths remained the same, but there were some changes designed to increase the load bearing capacities. The reinforcing bars increased in thickness. Visually, the 1930 design can be distinguished from its predecessors by the pierced concrete railing that was introduced at this time.

In 1933, a new set of standard plans were introduced by the State Roads Commission. This time their preparation was not announced in the Report; new standard plans were by this time nothing special - they had indeed become standard. Once again accommodating the ever-increasing demands of traffic, the roadway was increased, this time to 30 feet. The slab span's reinforcing bars remained the same diameter but were placed closer together to achieve still more load capacity.

When the bridge was built and/or given a major alteration, did it have a significant impact on the growth and development of the area?

The impact of the Conowingo Dam on the growth of the area is unknown, however, the creation of the reservoir flooded the former site of the village of Conowingo. As a result, the village was relocated and is now located east of the dam in Cecil County.

Is the bridge located in an area which may be eligible for historic designation and would the bridge add to or detract from the historic/visual character of the potential district?

The dam is located in an area which does not appear to be eligible for historic designation.

Is the bridge a significant example of its type?

The dam is a potentially significant example of an early twentieth century engineering structure, possessing a high degree of integrity, and is reportedly the longest concrete slab dam in the United States (Famighetti 1995: 704).

Does the bridge retain integrity of important elements described in Context Addendum?

The bridge component of the Conowingo Dam retains character-defining elements of concrete beam construction, including longitudinal beams, abutments and piers.

Is the bridge a significant example of the work of a manufacturer, designer, and/or engineer?

The Conowingo Dam is a potentially significant example of the work of the Boston-based firm of Stone and Webster.

Should the bridge be given further study before an evaluation of its significance is made?

A Maryland Historical Trust Inventory of Historic Properties Form should be completed for the Conowingo Dam and submitted to the Maryland Historical Trust for evaluation of its eligibility under the National Register of Historic Places Criteria for Evaluation.

BIBLIOGRAPHY:

County inspection/bridge files _____ **SHA inspection/bridge files** X____
Other (list):

Famighetti, Robert ed.
1995 *The World Almanac and Book of Facts 1996.* World Almanac Books, Mahwah, New Jersey.

Jackson, Donald C.
1988 *Great American Bridges and Dams.* The Preservation Press, Washington, D.C.

Ketchum, Milo S.
1908 *The Design of Highway Bridges and the Calculation of Stresses in Bridge Trusses.* The Engineering News Publishing Co., New York.

1920 *The Design of Highway Bridges of Steel, Timber and Concrete.* Second edition. McGraw-Hill Book Company, New York.

Lay, Maxwell Gordon
1992 *Ways of the World: A History of the World's Roads and of the Vehicles That Used Them.* Rutgers University Press, New Brunswick, New Jersey.

Luten, Daniel B.
1912 Concrete Bridges. *American Concrete Institute Proceedings* 8:631-640.

1917 *Reinforced Concrete Bridges.* National Bridge Company, Indianapolis, Indiana.

Maryland State Roads Commission
1930a *Report of the State Roads Commission for the Years 1927, 1928, 1929 and 1930.* State of Maryland, State Roads Commission, Baltimore.

1930b *Standard Plans.* State of Maryland, State Roads Commission, Baltimore.

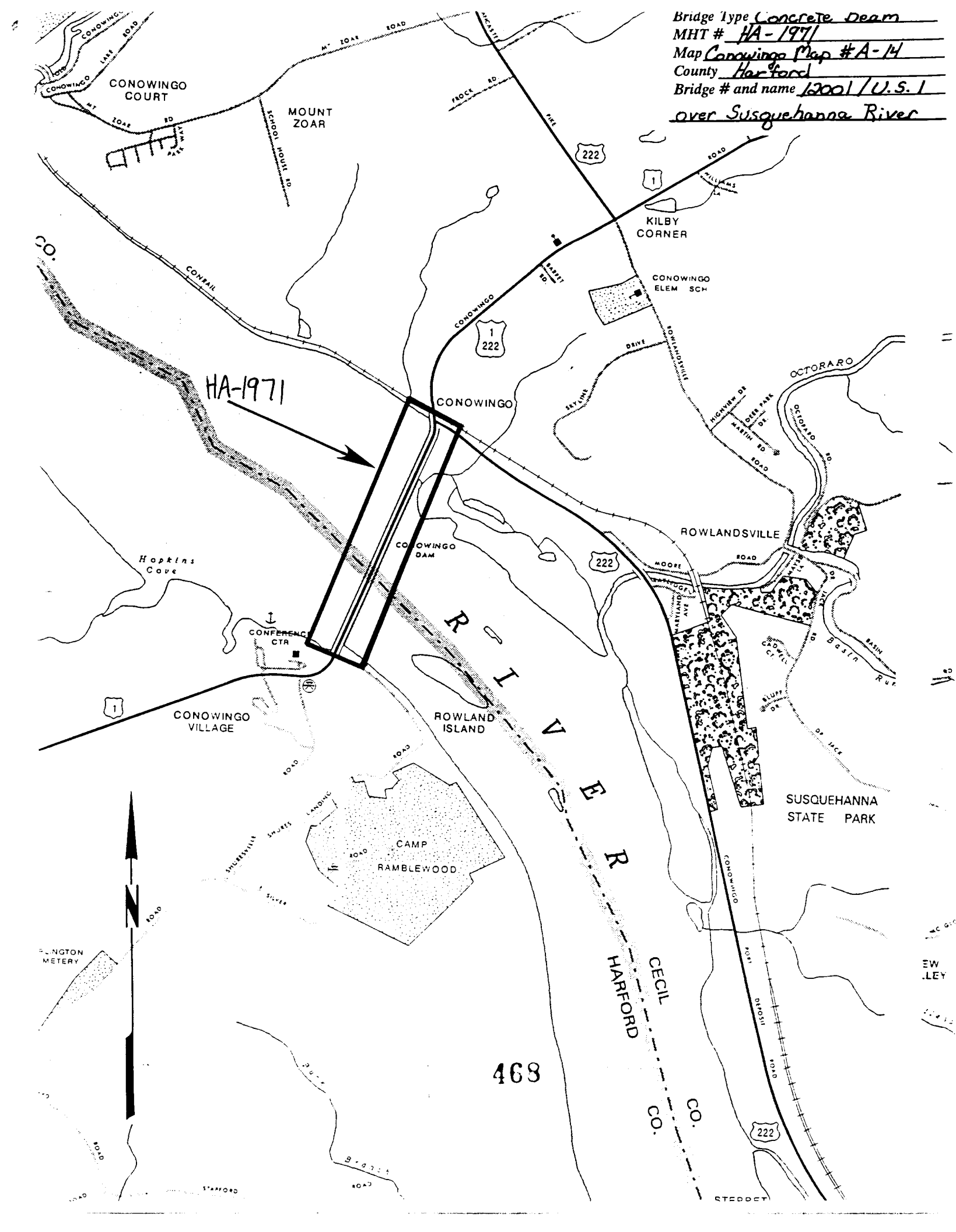
Maryland State Roads Commission
1958 *A History of Road Building in Maryland.* Published by author, Baltimore.

Taylor, Frederick W., Sanford E. Thompson, and Edward Smulski
1939 *Reinforced-Concrete Bridges with Formulas Applicable to Structural Steel and Concrete.* John Wiley & Sons, Inc., New York.

Tyrrell, H. Grattan
1909 *Concrete Bridges and Culverts for Both Railroads and Highways.* The Myron C. Clark Publishing Company, Chicago and New York.

SURVEYOR:

Date bridge recorded 2/25/97
Name of surveyor Caroline Hall
Organization/Address P.A.C. Spero & Co., 40 W. Chesapeake Avenue, Baltimore, MD 21204
Phone number (410) 296-1685 **FAX number** (410) 296-1670


Bridge Type Concrete Deam
MHT # HA-1971
Map Conowingo Map #A-14
County Harford
Bridge # and name 12001 / U.S. 1
over Susquehanna River
HA-1971
CONOWINGO COURT
MOUNT ZOAR
KILBY CORNER
CONOWINGO ELEM SCH
CONRAIL
CONOWINGO
CONOWINGO DAM
ROWLANDSVILLE
OCTORARO
Hopkins Cove
CONFERENCE CTR
CONOWINGO VILLAGE
ROWLAND ISLAND
CAMP RAMBLEWOOD
SUSQUEHANNA STATE PARK
SUSQUEHANNA RIVER
CECIL CO.
HARFORD CO.
468

1. MA - 1971
2. US 1 over Susquehanna River (1200)
3. Harford Co, MD
4. Caroline Hall
5. 3/97
6. MD SHPO
7. roadway approach
8. 1 of 9

1. HA-1971
2. US1 over Susquehanna River (12001)
3. Harford Co. MD
4. Caroline Hall
5. 3/97
6. MD SHPO
7. south side - dam
8. 2 of 9

1. HA-1971

2. USI over Susquehanna River (12001)

3. Harford Co. MD

4. Caroline Hall

5. 3/97

6. MD SHPO

7. south side - power plant

8. 3 of 9

1. HA-1971

2. US 1 over Susquehanna River (1001)

3. Harford Co. MD

4. Caroline Hall

5. 3/97

6. MD SHPO

7. south side - power plant

8. 4 of 9

1. HA - 1971
2. USGS Quad, Susquehanna River (1200')
3. Harford Co. MD
4. Caroline Hall
5. 3/97
6. MD SHPO
7. southside - dam
8. 5 of 9

1. HA-1971

2. 615 era Segueha via Rowe (1200)

3. Harford Co. MD

4. Caroline Hall

5. 3/97

6. MD SHPO

7. north side

8. 6 of 9

1. HA - 1971

2. US 1 over Susquehanna River (12001)

3. Harford County, MD

4. Caroline Hall

5. 3/97

6. MD SHPO

7. roadway approach

8. 7 of 9

1. HA-1971

2. US 1 over Susquehanna River, (1:00)

3. Harford County

4. Caroline Hall

5. 3/97

6. MD SHPO

7. south side

8. 8 of 9

1. HA-1971
2. US 1 over Susquehanna River (1201)
3. Harford Co, MD
4. Caroline Hall
5. 3/97
6. MD SHPO
7. detail of dam + substructure
8. 9 of 9